AL-TR-1991-0038

TRANSFER OF TRAINING FROM A RADAR INTERCEPT PART-TASK TRAINER TO AN F-16 FLIGHT SIMULATOR

Bernell J. Edwards

HUMAN RESOURCES DIRECTORATE
AIRCREW TRAINING RESEARCH DIVISION
Williams Air Force Base, AZ 85240-6457

David C. Hubbard

University of Dayton Research Institute
300 College Park Avenue
Dayton, OH 45469

August 1991

Final Technical Report for Period March 1988 – March 1991

Approved for public release; distribution is unlimited.

ARMSTRONG LABORATORY

AIR FORCE SYSTEMS COMMAND
BROOKS AIR FORCE BASE, TEXAS 78235-5000

NOTICES

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely Government-related procurement, the United States Government incurs no responsibility or any obligation whatsoever. The fact that the Government may have formulated or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication, or otherwise in any manner construed, as licensing the holder, or any other person or corporation; or as conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

The Office of Public Affairs has reviewed this report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

This report has been reviewed and is approved for publication.

BERNELL J. EDWARDS
Project Scientist

DEE H. ANDREWS, Technical Director
Aircrew Training Research Division

JOHN H. FULLER, JR., Colonel, USAF
Chief, Aircrew Training Research Division

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	August 1991	Final Technical Report - March 1988 - March 1991

4. TITLE AND SUBTITLE
Transfer of Training from a Radar Intercept Part-Task Trainer to an F-16 Flight Simulator

5. FUNDING NUMBERS
C - F33615-90-C-0005
PE - 62205F
PR - 1123
TA - 25, 03
WU - 03, 85

6. AUTHOR(S)
Bernell J. Edwards
David C. Hubbard

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
University of Dayton Research Institute
300 College Park Avenue
Dayton, OH 45469

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAMES(S) AND ADDRESS(ES)
Armstrong Laboratory
Human Resources Directorate
Aircrew Training Research Division
Williams Air Force Base, AZ 85240-6457

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
AL-TR-1991-0038

11. SUPPLEMENTARY NOTES
Armstrong Laboratory Technical Monitor: Dr. Bernell J. Edwards (602) 988-6561

12a DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

Fifty student pilots participated in an experiment to determine the training effectiveness of an experimental air intercept part-task trainer. F-16 student pilots with no prior knowledge of air intercepts were randomly assigned as subjects either to an experimental group or to a control group. Experimental subjects (n=25) learned to perform air intercept basic skills in the Air Intercept Trainer (AIT), followed by training on intercepts in an F-16 Operational Flight Trainer (OFT). Control group subjects (n=25) received only standard academic training on air intercepts prior to training in the OFT. Instructors, who were not informed of the assignment of subjects to groups during the experiment, rated student performance during OFT training using a 5-point scale (0-4) in five skill categories: (a) radar use, (b) aircraft control, (c) intercept geometry, (d) situational awareness, and (e) overall execution of intercepts. The number of trial intercepts required by each student to achieve a proficiency rating of 3 (overall execution of intercepts) was recorded. Mean composite ratings of the AIT-trained subjects were found to be higher than those of non-AIT-trained subjects in all five skill categories. These differences were statistically significant for all but the first category (radar use). The percentage of AIT-trained subjects who achieved Level 3 proficiency ratings on basic and advanced intercepts in the OFT was significantly higher than that for non-AIT-trained subjects on three out of four types of intercepts. These findings provide evidence that the AIT can improve training of basic intercepts compared to standard syllabus procedures alone.

14. SUBJECT TERMS			15. NUMBER OF PAGES
air intercept trainers	operational flight trainers	transfer of training	20
flight simulators	part-task trainers		16. PRICE CODE
flight trainers	training effectiveness		

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

CONTENTS

LIST OF TABLES

PREFACE

The training documented herein represents a portion of the research and development (R&D) program of the Armstrong Laboratory (AL), the thrust of which is aircrew training development. The general objective of this thrust is to identify and demonstrate cost-effective methods and media in training Air Force aircrew members. The present effort was conducted as a part of Work Unit 1123-25-03, Special Function Trainer Prototypes. Support was provided under Work Unit 1123-03-85, Flying Training Research Support, contract F33615-90-C-0005, with the University of Dayton Research Institute. Contract monitor was Capt Claire Fitzpatrick. The research was accomplished in cooperation with the Tactical Air Command (TAC) in accordance with the terms of a Memorandum of Agreeement between HQ TAC/DOT and AL. The purpose of the present effort was to determine the training effectiveness and overall suitability of a specific part-task trainer design concept for the F-16C schoolhouse application.

The determination of AIT training effectiveness in this R&D effort required training experimentation with F-16C B-course students participating as experimental subjects. Successful data collection was contingent upon special schedules, delay of AIT training for the subjects assigned to the control group, cooperation of instructors in providing performance ratings and other arrangements which were not a regular part of B-course training activities—inconveniences which training unit personnel bore in the interest of the trainer evaluation. Therefore, we wish to acknowledge the enthusiastic cooperation and excellent support received from units and individuals of the Tactical Air Command at Luke AFB, Arizona, without which the data could not have been successfully collected.

The authors gratefully acknowledge the contributions and support of TAC personnel who participated in planning the experiment, developing the performance rating instrument, providing personnel and facilities, and coordinating schedules to support the data collection. These persons include: (from the 4444th Operation Squadron, Detachment 1) Lt Colonel John Chambers, Lt Colonel Chet Martindale, Dr Dick Lund, Major Jack Moffat, Major Jack Hower, and Major Jay White; (from the 58th Tactical Training Squadron, Academics) Lt Colonel Ted Drake, Lt Colonel Steve Delaney, and Captain Frank Anderson.

TRANSFER OF TRAINING FROM A RADAR INTERCEPT PART-TASK TRAINER TO AN F-16 FLIGHT SIMULATOR

SUMMARY

This report documents an experiment to determine the training effectiveness of an advanced design, part-task trainer in an Air Force operational training unit environment. The purpose of this experiment was to assist HQ TAC/DOT to assess the training potential of the Air Intercept Trainer (AIT) as applied to initial qualification (replacement unit training) of F-16C pilots at the 58th Tactical Training Squadron (TTS), Luke AFB, Arizona. As detailed in the report, data collected during the experiment provide strong evidence of the training effectiveness of the AIT device. Findings support adoption of the AIT as a formal addition to the F-16C B-course training syllabus, as well as the desirability of acquiring additional AITs for other F-16 operational training units.

INTRODUCTION

The Air Intercept Trainer (AIT) was developed as a potential training alternative to operational flight simulation for training F-16 students to perform basic radar aspects of air-to-air intercepts. AIT research and development (R&D) is part of an Armstrong Laboratory program directed toward reducing the high cost of aircrew training while preserving combat readiness. Laboratory R&D in part-task trainer applications (Edwards, 1986; Pohlman & Edwards, 1985) indicates that in some cases, part-task training approaches, combined with inexpensive microcomputer designs, are potentially cost effective training solutions.

The AIT simulates the essential cockpit controls and those displays that are active during execution of the beyond-visual-range (BVR) aspects of air-to-air intercepts, including head-up display (HUD) and radar electro-optical (REO) display. Ownship maneuver capabilities are provided using F-16 throttle and stick controls. Flight dynamics and relative target movement for single and multiple targets are accurately simulated by the trainer. Aircraft subsystem simulation and flight dynamics are managed by 68030-type microprocessors in a Motorola VME 2000 microcomputer.

The AIT incorporates a student/instructor control station (S/ICS) from which either the instructor or the student can control instructional menus and training scenarios. A standard Zenith Z-248 microcomputer interfaced with the Motorola VME system provides instructional functions. Instructional features include the capability: (a) to freeze/resume simulated aircraft flight at any time, and (b) to display plan and overhead views of the ownship and adversary aircraft within the target area.

The B-Course (no previous fighter aircraft experience) training syllabus requires the student to learn to execute intercepts beginning with target acquisition at each of three positions relative to ownship: (a) head on (180 degrees), (b) front quarter (135 degrees), and (c) beam (90 degrees). In these tasks, target aircraft are programmed to move on constant headings at constant airspeeds. A multiple target scenario is available as an advanced difficulty intercept task to be used at the discretion of the operational flight trainer (OFT) instructor.

Background

The AIT was installed at the 58th Tactical Training Squadron (TTS) (Academics) at Luke AFB, Arizona, as a research testbed to determine its training utility, user acceptance, and operational reliability as an adjunct to the F-16C replacement training unit (RTU) B-Course. For purposes of experimental training, the B-Course syllabus was modified to include training on the device to

correspond with the academic content received immediately prior to intercept training in the OFT and in subsequent aircraft training.

Objective

Tactical Air Command (TAC) required an objective, empirically based training effectiveness test upon which to base possible future acquisition plans for the AIT. Accordingly, the laboratory objective for the experiment was to identify and assess specific transfer-of-training effects from the AIT device to the F-16 OFT.

APPROACH

Students

Students participating as subjects in the experiment were male second lieutenants enrolled in the F-16C B-Course training program at the 58th TTS, Luke AFB, Arizona. Prior to entering the course, subjects had no experience with the F-16 aircraft or with air-to-air radar intercepts. All subjects had completed undergraduate pilot training (UPT) and lead-in fighter training (LIFT) prior to enrollment in the B-Course at Luke AFB. In order to obtain a sufficient sample size (*N*) for the experiment, it was necessary to identify second lieutenant students in five classes across a period of approximately 16 months. The majority of students enrolled in the B-course at any one time are second lieutenants. Therefore, as a partial control for experience, it was decided that the few students who were not second lieutenants should be excluded from the experient. The numbers of students who participated in the research from the five classes were 10, 4, 9, 13, and 14, respectively, for a total *N* of 50 students. All participating students were randomly assigned to one of two training treatment groups: an AIT (experimental) group and a non-AIT (control) group.

Instructors

Instructor pilots participating in the experiment were five expert F-16 pilots normally assigned to those aspects of training which involve air intercept training. At no time during the data collection were the instructors informed as to which students were assigned to the experimental groups.

Statistical Design

The assignment of students to experimental and control groups resulted in a total of 25 students in each group. Because classes differed on student background, instructors, and time of year, it was decided to block subjects by classes and analyze results using a randomized block design, with class as a blocking factor and group (AIT vs. non-AIT) as the factor of interest.

Procedure

The experimental training of subjects on the AIT was designed to be accomplished with minimal interference to the requirements and flow of normal training activities.

Subjects were assigned to either an experimental group or a control group. The 25 experimental subjects received academic training on air intercepts as specified in the syllabus. Academic training consisted of approximately 2 hours of classroom lecture, supported with films and graphics presentations about air intercept concepts and procedures. Following academic instruction,

experimental subjects received a 20-minute introduction and explanation on the use of the AIT. They then participated in approximately 3 hours of self-paced AIT training. The AIT training provided drill and practice on all phases of the BVR portions of basic stern conversion air intercepts via HUD and REO instrumentation. The subtasks were as follows: radar use (symbology, target identification, and sorting); switchology (practice in the use of radar system controls such as target search, integration, and lock-on); and intercept geometry. The sequence of tasking during AIT training was mainly determined by the student himself. The AIT menu of scenarios provided a basic content structure, but with enough flexibility that the student could control his own pace and sequence of practice. Each student subject was permitted to allocate his time on the AIT over several training days into 2 or more training sessions. This provision avoided excessively protracted training sessions and allowed flexibility for individual schedules. AIT menus were designed to aid the student in assessing his own training progress and proficiency on intercept tasks. In addition, a technician was available during AIT training to assist the student in operating the device (not instruction of intercepts), if needed. Elapsed time spent by each subject on the AIT was monitored.

The 25 control subjects received academics training identical to that of the experimental group, with the exception of AIT training.

Following academics training, all subjects received identical training on air intercepts in the F-16 OFT. During this training, they were rated by instructors on their performance in executing intercepts.

Rating Instrument

Researchers and instructor pilots jointly developed the rating instrument used in the experiment. A copy of the rating form is contained in Appendix A. Performance criteria applied were derived from the standard rating system used by the Tactical Air Command in performance evaluation. A 5-point scale (0-4) was used, with the following behavioral descriptors as anchors for each point on the scale: 0 - lack of ability; 1 - limited ability; 2 - essentially correct; 3 - correct and skillful; and 4 - high degree of ability. Ratings of student performance were made in five categories: (a) radar use (including five skill components); (b) aircraft control (three skill components); (c) intercept geometry; (d) situational awareness; and (e) an overall composite rating of intercept attempted.

Also recorded on the rating form were the number of trials of each intercept type required to achieve Level 2 and Level 3 proficiency ratings.

OFT Training

The investigation of transfer of training from the AIT to the OFT was accomplished in the context of the F-16 standard B-Course syllabus. The seventh simulator sortie, OFT-7, is the first sortie in which the student officially encounters air intercepts and thus the logical point in training of which to conduct the transfer test. Prior to this simulator sortie, instructors briefed subjects on the training to be accomplished and the procedures to be followed. During the 90-minute training period, the student was trained primarily to perform air intercepts, although several other content areas were treated briefly. Time devoted to intercepts was approximately 1 hour. For purposes of the experiment, intercept training followed a standard sequence. All subjects received identical training and learned to perform three types of basic stern conversion air intercepts: (a) head-on, in which the adversary is positioned directly ahead of (180 degrees), facing the ownship; (b) front quarter (135 degrees); and (c) beam (90 degrees). From this initial position, the student was expected to use the information on his head-up display and/or radar display to correctly assess the range, bearing, and aspect angle of the "bogey" (adversary aircraft) in order to properly maneuver the aircraft so as to eventually roll-out on the bogey's tail. Approximately 90 percent of the intercept was accomplished via instrument flight reference (IFR).

Each subject received demonstrations in all three types of intercepts before attempting to perform any of them. The instructor, observing from the simulator control console, rated in substantial detail the skills demonstrated by the subject for the first head-on, front quarter, and beam intercepts attempted. Each primary skill area was broken down (see Rating Form, Appendix A) into several aspects for detailed assessment. The first three intercept attempts were intended to provide a baseline transfer-of-training test (from the AIT) and were performed with no feedback from the instructor. Thereafter, each intercept was rated by the instructor in five skill areas: (a) radar use, (b) aircraft control, (c) intercept geometry, (d) situational awareness, and (e) composite or overall performance of the intercept. The sequence of intercept trials attempted by students was distributed across types, beginning with a head-on, then a front quarter, then a beam, then back to head-on, and so forth, in that order. The objective was to achieve Level 3 proficiency, if possible, on each type of intercept. During these trials, the instructor provided feedback to the student as needed. Following rating of the basic intercepts, the student performed advanced intercepts at the discretion of the instructor, if time permitted. Advanced intercepts were the same as the basic types of intercepts, except that they involved multiple bogeys.

The exact number of intercepts attempted by each student was not controlled, but the average completion time per individual intercept during OFT-7 was about 4.2 minutes. The 90-minutes period in the OFT was carefully controlled, and intercept practice was uninterrupted; therefore, all subjects had very nearly the same amount of time for practice.

RESULTS

Basic Intercepts

The three basic intercepts—head-on, front quarter, and beam—were each evaluated on 18 rating scales. The data were averaged across the three basic intercepts to provide a mean rating on each of the 18 rating scales. These mean ratings were then analyzed using the randomized block design, which the five classes forming a control factor (blocks) and the AIT/non-AIT groups forming the treatment or Group factor. A separate analysis of rating scale differences among the three basic intercept types revealed that the obtained ratings for the three types of intercepts were similar. Thus, no significant information loss resulted as a function of this reduction procedure.

Composite Skill Ratings

The composite skill ratings consisted of five scales that were rated after three intercepts of each type were performed. The mean AIT group performance was rated higher on all five of these scales (see Table 1). Four of the five differences were statistically significant at the .05 level. Performance for the first evaluation scale, Radar Use, was not significantly different across the two groups. The other four scale differences were significant (see Table 1).

Component Skill Ratings

There were 13 separate scales designed to evaluate performance in six categories. These scales were evaluated after the initial performance of each type of intercept. These scales constitute an initial impression and, as such, are probably less reliable than the composite ratings. Some of these scales were not marked by the instructor when he was unable to rate the student's performance after one trial. For some students, a few of the scales were not used for any of the three basic sorties. An analysis of overall component skill performance was obtained by averaging all 13 skill component ratings to obtain an overall component mean. The AIT group scored significantly higher than the non-AIT group on this overall component score ($F(1,44) = 6.56$, $p = .0139$). The AIT group mean was

higher than the non-AIT group mean on all 13 scales, although the difference was statistically significant on only 3 of the 13 (see Table 2): the Bearing Range Altitude Report of the Target Assessment ($F(1,44) = 6.37$, $p = .0153$) and two of the three Offset Angle assessments, Attainment of Adequate Offset Angle ($F(1,44) = 9.74$, $p = .0032$) and Maintenance of Offset Angle ($F(1,44) = 9.79$, $p = .0031$).

TABLE 1. **MEAN COMPOSITE SCORES FOR BASIC INTERCEPTS**

	AIT	Non-AIT	Standard Error	F(df)	p
Radar Use	2.33	2.00	0.11	3.49 (1,44)	.0684
Aircraft Control	2.62	2.28	0.10	6.26 (1,44)	.0161
Intercept Geometry	2.38	1.87	0.12	9.42 (1,44)	.0037
Situational Awareness	2.40	1.90	0.13	7.21 (1,44)	.0102
Overall Intercept	2.44	1.92	0.13	7.54 (1,44)	.0087

Note. Scores are averages of composite evaluations for the three basic types of intercepts. Composite scores were given for each type of intercept after the third repetition.

TABLE 2. **MEAN RATINGS OF COMPONENT SCORES FOR BASIC INTERCEPTS**

	AIT	Non-AIT	F(df)	p
Mean of All Component Scores	1.81	1.34	6.56 (1,44)	.0139
GCI Procedure	1.62	1.22	3.60 (1,37)*	.0658
Radar Scales				
Radar Search	2.04	1.73	1.75 (1,44)	.1924
Radar Range	2.17	1.83	1.95 (1,44)	.1696
Radar Azimuth	2.02	1.74	1.88 (1,44)	.1770
Radar Placement	1.84	1.41	2.40 (1,44)	.1288
Target Assessment	1.65	0.99	6.37 (1,44)	.0153
Collision Antenna Target Angle				
Attain CATA	1.27	0.98	1.74 (1,41)*	.1944
Maintain CATA	1.27	0.85	2.76 (1,41)*	.1044
Offset Angle				
Turns in Proper Direction	1.94	1.69	2.52 (1,44)	.1199
Adequate Offset	2.02	1.40	9.74 (1,44)	.0032
Maintain Offset	1.89	1.31	9.79 (1,44)	.0031
Conversion				
Roll-Out	1.43	1.11	2.88 (1,44)	.0968
Weapons Employment	1.55	1.34	1.03 (1,44)	.3156

Note. The first entry, Mean of All Component Scores, is the mean of all 13 component scales across the three basic intercepts. Individual component scores are based on the means of the three basic intercepts.

*Degrees of freedom are less because this scale was not used for some subjects.

Advanced Intercepts

Many of the subjects did not perform advanced intercepts. Of the AIT group, 61.6% performed advanced intercepts, whereas in the non-AIT group, only 37.7% performed advanced intercepts. Thus, the AIT group performed a greater number of intercepts on the average than did the non-AIT group (2.3 vs. 1.2). This difference was significant ($F(1,44) = 4.91$, $p = .0320$). The total number of intercepts performed of all types (basic and advanced) was not significantly different for the two groups ($F(1,44) = 2.54$, $p = .1180$). The average number of intercepts for the AIT group was 14.4, whereas the average number for the non-AIT group was 13.3.

Attainment of Level 2 and Level 3 Proficiency

The rating sheet for each student provided an indicator for the achievement of both Level 2 and Level 3 proficiency for each of the four types of intercepts. When each type of intercept is considered individually, the AIT group attained a minimum of Level 2 proficiency on more types of intercepts (3.4 vs. 2.9) than did the non-AIT group ($F(1,44) = 4.75$, $p = .0346$). Also, Level 3 proficiency was obtained on more types of intercepts for the AIT group (2.7 vs. 1.5) than for the Non-AIT group. This difference was also significant ($F(1,44) = 7.25$, $p = .0346$).

DISCUSSION

The composite ratings present a clear picture of skill transfer. Comparisons of instructor ratings were significant for four of the five composites (aircraft control, intercept geometry, situational awareness, and overall intercept execution skills). Only radar use skills failed to attain the .05 level of significance. Nevertheless, the observed probability ($p = .068$) is small enough to suggest there may be a tendency for the AIT group to be rated higher than the non-AIT group on radar skills.

The performance differences on the initial three intercepts were higher for the AIT group in all skills, across all types of intercepts. However, differences were significant for only three skills: target assessment (bearing, range, and altitude information), attaining adequate offset angle, and maintaining offset angle.

Finally, achievement of criterion performance on intercepts during OFT-7 must be considered the primary indicator of successful transfer to the simulator phase, with the attainment of Level 3 proficiency (correct and skillful) being obviously more noteworthy than attainment of Level 2 proficiency (essentially correct). The number of individuals in the AIT group achieving Level 3 ratings on all types of intercepts was significantly greater than that for the non-AIT group.

The results can be summarized as follows: Relative to the non-AIT group, the AIT-trained group (a) achieved higher ratings in all but one skill area, as indicated by the statistically significantly higher composite ratings in all skills but radar use; (b) achieved proficiency Levels 2 and 3 in significantly greater numbers and on significantly more types of intercepts; and (c) were able to fly significantly more advanced intercepts. On advanced intercepts, a significantly higher percentage of AIT-trained subjects achieved Level 3 proficiency.

The purpose of this research was to provide an empirically based answer to TAC's question, "What is the net training effect of adding the AIT to the B-course syllabus?" The findings from this experiment clearly indicate the transfer effectiveness of AIT training to the simulator. The results demonstrate that the AIT-trained student comes to the OFT phase at a substantially higher level of readiness, and exhibits apparent increased training efficiency in the OFT. The subjective judgment of the instructors and training managers associated with this effort was that the AIT, as applied during this experiment, represented a savings of at least one simulator sortie during the B-course.

The AIT has been judged by TAC to be a highly successful training innovation. In addition to the empirical evidence of training effectiveness documented in the present report, user acceptance, device reliability, and general trainer utility within the training program have all been high. As a result of these successes, a duplicate AIT was installed at the other F-16 schoolhouse (56th TTS at McDill AFB, Florida) in October 1990, with subsequent formal adoption of the AIT into the syllabi of both the B-course and the TX F-16 training courses.

CONCLUSIONS

Additional intensive training with the AIT prior to, or interspersed with, training on the OFT should further reduce training time in the simulator for perfecting air intercept skills. In response to the urgent need to reduce training unit budgets, an appropriate follow-on to the present experiment would be a full test of the limits of the AIT as a potential replacement for all air intercept-related, ground-based training (major portions of three sorties) now trained in the OFT during the B-course.

REFERENCES

Edwards, B.J. (1986). *Effectiveness of low-cost avionics simulation for aircrew procedural training* (AFHRL-TR-85-38, AD-A169 198). Williams AFB, AZ: Operations Training Division, Air Force Human Resources Laboratory.

Pohlman, D.L., & Edwards, B.J. (1985). Transfer of training of an aircrew procedural task using microcomputer graphics. *In Proceedings of the Symposium on the Transfer of Training to Military and Operations Systems*, Brussels, Belgium.

APPENDIX A: RATING FORM

	HEAD-ON (180)	FRONT QUARTER (135)	BEAM (90)	ADVANCED INTERCEPTS
GCI Procedure-RT	UD01234	UD01234	UD01234	UD01234
RADAR USE				
A. Search	UD01234	UD01234	UD01234	UD01234
B. Range (scope)	UD01234	UD01234	UD01234	UD01234
C. Azimuth	UD01234	UD01234	UD01234	UD01234
D. Ac. Symbol Placement	UD01234	UD01234	UD01234	UD01234
TARGET ASSESSMENT				
Give BRA Report	UD01234	UD01234	UD01234	UD01234
COLLISION				
A. Attain CATA (if applicable)	UD01234	UD01234	UD01234	UD01234
B. Maintain CATA to range	UD01234	UD01234	UD01234	UD01234
OFFSET				
A. Turn in proper direction	UD01234	UD01234	UD01234	UD01234
B. Adequate offset	UD01234	UD01234	UD01234	UD01234
C. Maintain offset to param	UD01234	UD01234	UD01234	UD01234
CONVERSION				
A. Roll-out parameters	UD01234	UD01234	UD01234	UD01234
B. Weapons employment	UD01234	UD01234	UD01234	UD01234
COMPOSITE RATING AFTER 3 REPS				
A. Radar utilization	UD01234	UD01234	UD01234	UD01234
B. Aircraft control	UD01234	UD01234	UD01234	UD01234
C. Intercept geometry	UD01234	UD01234	UD01234	UD01234
D. Situational awareness	UD01234	UD01234	UD01234	UD01234
E. Overall intercept	UD01234	UD01234	UD01234	UD01234
NUMBER OF REPS TO LEVEL 2	_____	_____	_____	_____
NUMBER OF REPS TO LEVEL 3	_____	_____	_____	_____
TOTAL NUMBER ACCOMPLISHED	_____	_____	_____	_____

RATING KEY

U = Unknown*
D = Dangerous**
0 = Lack of ability
1 = Limited ability
2 = Essentially correct
3 = Correct and skillful
4 = High degree of ability

* Unknown was coded as missing

** Dangerous was not used in any evaluation by any of the instructor pilots